SUPPLEMENT.

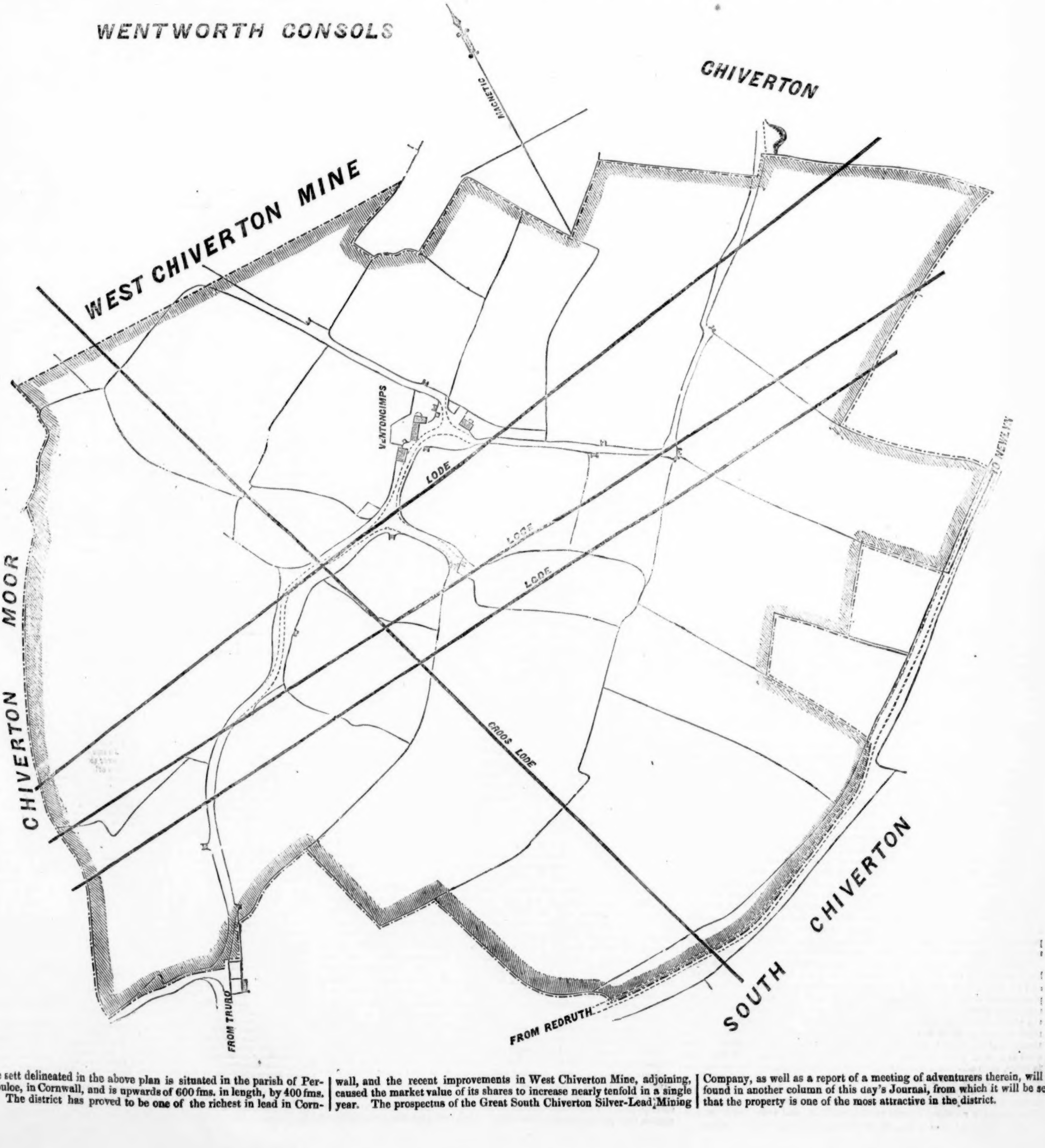
The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1495.—Vol. XXXIV.] LONDON, SATURDAY, APRIL 16, 1864. [WITH JOURNAL] STAMPED.... SIXPENCE. UNSTAMPED. FIVEPENCE.

PLAN OF THE GREAT SOUTH CHIVERTON MINING DISTRICT.



The sett delineated in the above plan is situated in the parish of Perranzabuloe, in Cornwall, and is upwards of 600 fms. in length, by 400 fms. wide. The district has proved to be one of the richest in lead in Cornwall, and the recent improvements in West Chiverton Mine, adjoining, caused the market value of its shares to increase nearly tenfold in a single year. The prospectus of the Great South Chiverton Silver-Lead Mining Company, as well as a report of a meeting of adventurers therein, will be found in another column of this day's Journal, from which it will be seen that the property is one of the most attractive in the district.

THE VENTILATION OF MINES.*

ON THE APPLICATION AND DISTRIBUTION OF AIR CURRENTS.

Having mentioned some of the inconveniences from foul air and noxious gases which miners have to contend with in all underground operations, and to get rid of, either by sweeping them out of the workings, or to destroy their vitiating power by throwing in an excess of pure air, there remains now to be considered under this subject of ventilating mines, the most important point; how is this current of air to be produced and applied? and in undertaking this branch of our subject it will be well to treat it under two heads.—1. The production of the current.—2. The distribution of the air through the mine.

A great mistake is commonly made by those who think that in the conception of some good machine for supplying a powerful current of air, the whole difficulty of ventilating mines is overcome. Nothing is more erroneous than this, for there may be a perfect hurricane blowing through a mine, and yet the workings badly ventilated, through an imperfect application of the current of air. We can but consider it a most fortunate circumstance that Nature produces currents in many instances, and that she only requires to be aided to perform effectually the requirements of the miner; but although this may be often true, there are many cases where artificial currents are needed. These latter instances we will speak of afterwards. But, first, less us speak of those cases where we may trust to natural ventilation. Now, the simplest of all mining operations are those confined to an adit level; and if we examine what takes place in one of these simple workings we shall find that as we recede from the mouth of the level, the air becomes warmed by many causes, such as the respiration of the men, the combustion of the candles, &c.; this heated air becoming rarified, rises to the top of the level, and gradually forces its way out to the mouth of the adit, and as it flows out at the top it is replaced by cold air flowing in along the bottom. By applying the principle on which the current is here produced, a level may be carried a great distance. The air, however, is exposed to great friction, and unless the level be large and smooth we cannot expect to carry the current any great distance from the entrance. The same natural current which is set up in the case of the level, will be also set up in a shaft; in this case, however, the current will steal down the sides of the shaft, and pass up its centre.

Now, where there are two orifices to a mine, let us look into the kind of action, with reference to what takes place with regard to the air currents. Let the two shafts, communicate beneath by a level, and suppose the ground at the surface slopes, so as to make one shaft deeper than the other; in the winter time we shall find under such circumstances, that the column of air is much colder in the shorter than in the longer shaft, and that the rarified air in the longer shaft will be pressed out by the greater weight of the air in the shorter shaft; thus a current of air will be induced, which will flow down the shorter and out of the longer shaft. Such, however, will not be the case all the year round, for in the summer time we shall find that the temperature of the atmosphere being higher than that of the workings, the current will be reversed to what it was in the winter. And at the time of the equinoxes, when the temperature of the air will be pretty much that of the mine, the air will become stagnant; and thus trusting to this sort of ventilation alone, becomes very dangerous. This stagnation is not an uncommon occurrence in some of the wretchedly managed collieries of the South of Staffordshire, where, trusting entirely to such ventilation, from the fighting of the air, as they call it, at certain seasons, the men are unable to work in the mine. Above all, to trust to this unaided and natural ventilation is peculiarly dangerous where there is fire-damp in the workings. Instances of this may be seen in some of the collieries of North Wales, where there are two pits, and the supply of air is dependent on the currents produced by Nature. Now, some parts of these collieries are fiery, others not so, and it is the custom to lead the air through the purer parts of the colliery first, and from thence to those parts from which the gas emanates, the men working near the downcast with naked lights, and near the upcast with safety-lamps. The air enters pure, but as it passes through the mine becomes fouled and explosive. Now, if from external causes the natural current should become reversed, as is quite possible in the height of summer, the foul air would flow back on the naked lights, and, probably, suffocate the men, or lead to a terrific explosion.

In undertaking the ventilation of a mine it should be remembered that the air after entering becomes rarefied in the heated workings, and that it increases in bulk in consequence of this, as well as from the addition of the gases it picks up in its course through the workings, so that when it makes its exit its volume is greatly augmented. In collieries the entering current of fresh air is called the "intake," the outgoing the "return," and the shaft through which the fresh air enters is called the "downcast," that through which the foul air escapes the "upcast." Now, there has been a great deal of discussion amongst practical colliers from time to time as to which shaft ought to be of the larger diameter, the upcast or the downcast, and most various are the opinions on the subject. To settle this much-vexed question, some experiments were make in stacks of different forms, some smaller at the base than at the top, others larger, and others of equal diameter throughout their length, and it was then found that the best results were obtained—*i.e.*, the most powerful current was produced—in those stacks that were cylindrical. In Lincolnshire they commonly held that the upcast shaft ought to be smaller than the downcast, a notion that can only have arisen from observing the greater force of the current escaping where the upcast is the smaller of the two. In fact, when we consider that we have an expanded quantity of air to get rid of through the upcast, it stands to reason that that shaft ought to be the larger.

Let us see now what artificial aids can be brought to bear in assisting natural ventilation. In most metalliferous mines there is a sufficient current of air through the upper workings, and it is only at considerable depths that it is necessary to aid the natural currents to produce perfect ventilation. The natural current may be caused by one shaft being longer than the other from undulations of the ground at the surface, or from there being an adit communicating with one shaft. Now, where there is no such determining cause for a current, we may induce it by building over the mouth of one shaft a stack of stone, which has simply the effect of destroying the equilibrium of the air in the two shafts. This plan has been objected to on the ground that it renders the shaft over which the chimney is built useless for other purposes. The plan has been, however, most successful in many collieries, and where the shaft has been required for winding a simple modification has been adopted, which is to place the stack on the one side of the main shaft, and to make a communication between its base and the main shaft below the surface. The air is then made to pass along this channel, and thence up the chimney by a trapdoor placed on the main shaft, which door is only open whilst winding or drawing is being carried on.

Another plan, formerly more common than now in the case of small mines, was that of putting over the shaft's mouth a "horse's head," or cowl, similar to those placed on the tops of chimneys. This cowl is supplied with a vane, which has the effect of bringing its orifice in such a direction that the wind blows into it, and so passes down into the workings. Sometimes the opposite shaft is fitted with another cowl, the vane of which is so arranged that the mouth of the orifice points away from the wind. This mode is one by which ventilation may often be assisted, and is one to be seen in many of the mines in the limestone of Flintshire. This brings us to the subject of air-pipes, which have been employed largely in some mines; as it also brings us to the subject of obtaining two channels for the air. Under this last head, it may be stated that when we find it a difficult matter to get two shafts in a mine we may divide the single one into two for ventilating purposes by brattices, and make one-half the upcast and the other half the downcast. Another device for the same purpose is to construct a small shaft by the side of the main one, and to divide it from the main one by a brick wall; this, however, is merely a modification of the plan of dividing the shaft itself by brickwork; and, like the preceding, is much inferior to the plan of having two shafts wherever it is possible.

In underground operations it is sometimes required to ventilate a long level, and to do this a common method, where the level is tolerably high, and its lower part convex, is to place over the hollow bottom a row of planks, and on these planks a covering of turf. By this means a good temporary air-way may be formed, but where a permanent road is required the planks should be replaced by an arch of brick. Another plan in stratified ground is to cut out a trumpeting, or nich, at the side of the level, throughout its length, and to plank it up. Again, a more common method is that of placing along the level air-pipes or boxes. If the level is large, such air-boxes are usually made of thin plank, and fit into one another, the joints being rendered air-tight by well-tempered mud. The boxes are then cramped to the side of the level. Lead pipes have been attempted instead of wooden boxes, but are found to be very expensive. Zinc pipes are considered good for this purpose, and even papier mache has been tried, but is found utterly useless, except where the level is quite dry. The best of all air-pipes are those made of cast-iron, and it is a pity they are not more employed for the purpose. All these contrivances, however, ought to be looked on as temporary, and subsidiary to the usual methods of our collieries, where we have two distinct and separate roads or passages for the air.

The nature of the ventilating apparatus will, of course, vary with the nature of the deposit in which the workings are situated. In working a thick seam of coal, such as the Dudley seam, the air-drift is commonly made at the side of the workings, and a great portion of the thickness of the coal lies above the level of the drift, so that when the coal is all worked away the foul air rises to the top and there remains. It was, therefore, proposed, and thought a wonderful idea, to carry the air-road above the main headings, and by this it was thought all explosions from the collection of foul air would be avoided. The discovery, if it may be called so, would, however, only apply to thick seams. The great mistake is, not so much in placing the air-road in any particular position, but rather in making it so absurdly small. In some of our coal mines the air-roads are carried through the adjoining shales; and, being imperfectly looked after, often become choked from the falling of the shale. This danger is so thoroughly recognised in the better managed collieries in the North of England that men are there especially appointed to keep the air-ways in good working order.

Natural ventilation may be most successfully employed in metalliferous mines where the shafts and levels are all of good size. The Great Laxey Mine is ventilated by no other means than what may be termed spontaneous ventilation, and there the temperature at the bottom of the mine is no higher than at the surface. We might cite other remarkable instances of perfect ventilation, by simply assisting the natural tendency of the air currents in a mine, and one especially may be mentioned—the long adit 220 fathoms under surface, and 3200 metres long, driven to unwater the mines of Schemnitz; throughout its whole length there was no shaft communicating with the surface, and no ventilation but by natural currents properly applied. We may mention, as an instance of the successful application of natural currents to colliery ventilation, the Tyne Colliery, where the shaft was 672 feet deep. The temperature at the surface was 43° Fahr., at the bottom of the downcast shaft 46° Fahr., at the bottom of the upcast 63° Fahr., and the amount of air passed through the colliery per minute was 36,564 ft. The simplest mode of carrying out a ventilating current by this principle is that of increasing the temperature in one shaft. The oldest device of this sort was that of lowering a fire into the upcast shaft whenever the direction of the current of air became uncertain. The next improvement on this rude mode was that of forming a regular furnace, of which there were two sorts. The first, where the furnace was placed at the mouth of the shaft, and the escaping air was brought over the fire, which, of course, did not in any way affect the column of air in the shaft itself, and was, consequently, valueless; the second was that of burning a small fire at the bottom of the upcast shaft. All these, however, have been abolished for regular furnaces built in the shafts. Such furnaces should be separated from the inflammable coal by well-built brick arches, placed one over the other. The dimensions of these furnaces are very various, some are 4 ft., others 5, 6, and 7 ft. wide; they are always put at the bottom of the upcast shaft, their object being to raise the temperature of the column of air in that shaft. The question now arises, ought the air to be passed under, through, or above the fire? On this point there are a variety of opinions; in all cases, however, where the air is fouled, from the presence of carburetted hydrogen, it should not be allowed to come near the fire, but should be carried over it in a dumb drift, completely isolated from the furnace the heated air, from which should join the shaft some distance above. The furnace should be fed by a current of fresh air brought especially into the mine for the purpose. Such an arrangement prevents all chance of an explosion. In ventilating by furnaces, the temperature of the upcast is often raised from 140° to 150° Fahr., which gives so great an excess in favour of the upcast that the current of air is abundant. A modification, and a great improvement on the ordinary form of ventilating furnace, has been lately put up at the Hetton Colliery. This new furnace is very large, being 26 ft. in length, and has this great advantage, amongst others, that the bars can be easily cleaned by raking the fire from one part of the furnace to the other, an operation which in the usual furnace it is not easy to perform without putting out the fire.

* Notes from a Lecture by Prof. W. W. SMYTH, at the Royal School of Mines.

PLAIN PAPERS ON GEOLOGY—No. I.

BY THOMAS STRUTHERS.

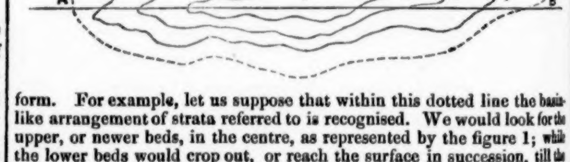
STRATIFIED ROCKS.—There is abundant evidence to prove that the stratified, or aqueous rocks, were originally deposited in water as layers of sediment, and afterwards more or less compacted by the pressure of superincumbent materials, by heat, by chemical processes, or otherwise, and elevated to their present position by volcanic agency, forming our sandstones, slates, &c., the limestones having, for the most part, been secreted from the waters by a sort of animal chemistry. These water-formed rocks are classified in accordance with their age, organic contents, and mineral composition. The oldest, or *first* in order, are denominated primary, those that succeed are termed secondary, and they are followed by the tertiary and post-tertiary. To indicate peculiarities connected with their fossil contents, the primary rocks are distinguished as Palæozoic—*i.e.*, containing antique life; the secondary, as Mesozoic, middle life; the tertiary, as Cainozoic, recent life; and to the post-tertiary we may apply the term Anthropozic, human life. To indicate the prevailing forms of life during successive stages of the earth's history, we may embrace these rocks in four ages—The age of fishes, the age of reptiles, the age of mammals, and the age of man. With reference to their composition, the statified rocks are usually classed as argillaceous (clayey), siliceous (flinty), calcareous (limy), and carbonaceous (coaly); but it must be understood that not unfrequently two or more of these properties may be combined in the same rock—thus, for example, we have calcareous sandstone, carbonaceous shale, and so on. Taken in detail, the stratified rocks are arranged into systems, which are again divided into groups, sub-groups, &c. The terms employed to designate the different systems are, like the alphabet of our language, a piece of patchwork, some bearing reference to the colour or composition of particular rocks, others to localities in which they are typically developed, or to their relative order of superposition. In geological nomenclature we recognise also a number of German miners' terms, introduced by Werner, and not a few English provincial terms, adopted by William Smith, the founder of the geological doctrine of the "succession of life in time," while, indeed, almost every mining district has contributed some technical term to the *omnium gatherum* of the geological vocabulary. To apprehend correctly what is meant by the terms "system" and "group," let us go back in imagination to any particular geological epoch, and conceive the earth's surface as consisting of a series of watery hollows and land areas, differently distributed from those of the present day; the former containing their peculiar types of aquatic life, and strewn with representatives of the terrestrial plants and animals of the period, swept by rivers into these aqueous reservoirs along with the earthy *detritus*, of which the stratified rocks mainly consist. Volcanic agency, ever more or less active, may produce partial oscillations, in some cases raising, and in others depressing these basins of deposit, and, it may be, here and there scattering from subaerial insular volcanic craters, showers of dust and ashes, or discharging from their submerged flanks streams of molten lava, that become interstratified with the materials more gradually accumulated by aqueous agency. The various instruments of change, operating in some cases gradually, and in others suddenly, after the lapse of ages, produce a decided alteration in the relative distribution of sea and land, and, consequently, of climate. New races of plants and animals gradually take the place of those that had died out under the influence of adverse circumstances. A volume of the geologic history of the earth has been completed, the various layers of rock matter are its leaves, and the organic remains they contain its pictorial illustrations and chronological data. Fragmentary, no doubt, are these wrecks of the past life of the globe, and inexplicable they may appear to the unskilled observer. It is the task of the geologist to disinter the rock-entombed remnants of former denizens of the earth, the air, and the water, to link together their scattered bones, to re-inspire their shrunken forms with the breath of life, to revive the blighted foliage of many a graceful shrub and noble tree, and assign to each and all their places in a picture of the epoch of which they constituted a distinctive feature.

Such a picture would represent the restored aspect of what has been called a geological "formation" or "system," which is made up of subordinate groups of strata, bearing some analogy to each other in their organic remains, and it may be in lithogical features, but not exactly identical in either; for even in the now apparently stable condition of the earth's surface, judging from our experience of the present, we are led to the conclusion that partial changes are taking place, and producing modifications of the order of things, which, however, will be superseded only after the lapse of a protracted period, at least so long as the present laws of Nature continue in force. Thus, the lower and upper beds of a system may present a difference of lithological aspect, and contain some organic remains of a dissimilar character; but both will exhibit certain physical features, and be distinguished by containing certain species in common, which will stamp them as equally the products of one geological era, during which the same general conditions exerted a controlling influence. Considerable areas of the submerged basins of a particular period will be elevated, and form dry land in succeeding eras, while other portions may continue under water. The latter are overlaid by the deposits of a newer formation, while the former remain as the surface rocks; so that in one district of a country we may find at the surface rocks of Silurian age, and in another Old Red Sandstone; or, it may be, strata embraced in the Carboniferous system; and such a statement will account for the fact that the whole series of stratified rocks is not found complete in one locality. To have a correct understanding of the position and mode of occurrence of the stratified rocks we must fix in our minds the idea of an original hollow or water bed of greater or less extent, gradually filled up with a series of deposits, argillaceous, siliceous, calcareous, and, it may be, carbonaceous, as well as of a mixed character, derived partly from the land by the transporting power of rivers, and partly from the water by the secreting power of living creatures, such as molluscs, foramenifera, and coral-forming zoophytes. The oldest, or first formed of these deposits, would, as a matter of course, occupy the bottom of the basin, while the newer overlie them. The upheaving power of volcanic action, in many cases accompanied by the eruption of masses of rock matter, exerted over portions of this basin will have the effect not only of elevating those portions above the waters, but of giving them a form according to the outline of the area affected, as well as to the extent and method of the force, while agencies taking effect subsequent to their upheaval, particularly such an agency as denudation—that is, the destructive power of water or ice—will also be found to have contributed in no ordinary degree to the peculiar arrangement of the stratified rocks of the earth's crust.

By the operation of such causes it is not unusual to find the strata, particularly of the Carboniferous system, arranged in a basin-like form, the highest beds being the most circumscribed in their superficial range, and occupying a central position, the lower forming successive zones round them, and all dipping or sloping towards the centre of the basin, at a greater or less angle, according to its configuration. This will not be found invariably the case, but it is well to set out with this idea. A careful examination of the strata will, in most cases, present many phenomena, resulting from peculiarities connected with the deposition of the materials of which they consist, such as the wider distribution of the finer grained sediment, composed of sand or clay, and the more local character of the coarser grits, conglomerates, and breccias, as also the thinning out of particular beds, and the varying mineral composition of others; while not less striking will be the evidence of volcanic action during, and subsequent to, the formation of the strata, as indicated by the presence of igneous rocks of various ages, either in the form of dykes or flats, as well as by numerous dislocations, too well known to the practical miner, the originally horizontal or inclined strata being, in many instances, so much disturbed as to be thrown into a vertical position, or so crushed and contorted as to render a detailed geological examination of particular districts a work of considerable difficulty and uncertainty.

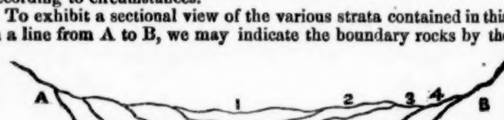
The denuding agency of ice during the Newer Pliocene glacial period will be found to have exerted a powerful modifying effect; here levelling the surface, or scooping out deep valleys or lake beds, and there piling up immense heaps of clay, sand, and gravel, intermingled with fragments of rock: nor can we overlook the evidence of denudation by which portions of the sea-bottom elevated during the period had been affected. So powerful, indeed, have these disturbing forces been, that in many instances there is good reason to believe the original boundary of the basin of deposit, even where not submerged in our present seas, has been completely changed; while occasionally a few fragmentary patches are all that remain to attest the former existence of whole systems of strata now swept away.

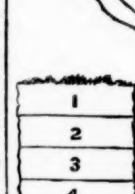
Such a basin of deposit as described may be represented in three ways: —1. As a map, or "bird's-eye" view.—2. In section.—3. In a tabular



form. For example, let us suppose that within this dotted line the basin-like arrangement of strata referred to is recognised. We would look for the upper, or newer beds, in the centre, as represented by the figure 1; while the lower beds would crop out, or reach the surface in succession, till the extreme limit of the basin were reached. The marginal beds, 4, might either rest upon igneous or stratified rocks, or to be overlaid by the former, according to circumstances.

To exhibit a sectional view of the various strata contained in this basin, in a line from A to B, we may indicate the boundary rocks by these letters;





while the figures 1, 2, 3, 4, will mark the different groups of strata. Proceeding to the margin from the central, or newest group, marked 1, although we may be rising to a higher level, we are descending in the scale of strata from the newer to the older, which crop out in succession. These different groups would be tabulated in the following manner, and numerous examples of such an arrangement of stratified rocks occur in all parts of the world.

MANCHESTER ASSOCIATION FOR THE PREVENTION OF STEAM-BOILER EXPLOSIONS.—At the ordinary monthly meeting of this association, on Tuesday (Mr. W. Fairbairn, C.E., in the chair), the report of the chief engineer, Mr. L. E. Fletcher, stated that during the past month 311 engines have been examined, and 418 boilers; 20 of the latter being examined specially, and 4 of them tested with hydraulic pressure. Of the 418 boiler examinations, 333 have been external, 11 internal, and 74 thorough. In the boilers examined, 255 defects have been discovered, 4 of them being dangerous. In one of the defects the boiler was an elephant, and one of the lower tubes gave way over the fire, the plate bulging downwards into a cup shape, and the metal, which was originally three-eighths of an inch in thickness, being wasted away to three-sixteenths. The feed-water was very sedimentary, and in this construction of boiler, as, indeed, in all those fired underneath, the sediment is apt to lodge in the most dangerous part—immediately over the fire. Instances of the danger attending the plan of external firing are constantly occurring. It may be added that the plates of the lower cylinders in these elephant boilers frequently become burnt away, in consequence of the steam being confined in the lower chamber, through imperfect circulation of the water. Also these boilers are extravagant in their consumption of fuel, and very dependent on the integity of their brickwork setting, which is found to be a frequent source of trouble and expense; while the arrangement of fittings, such as water-gauges, &c., is complicated and inconvenient.

Amongst the cases of deficiency of water was one which was due to the watchman's keeping up the fires within the boiler without noticing that the water was out of sight in the gauge glass. It appears that the boiler lost its water through leakage at the back pressure valve. Owing, however, to the inlet being nearly as high as the furnace crowns, the damage done to them was but trifling. Where the feed is introduced a little above the level of the furnace-crowns, they cannot be laid bare by the water either being drained or syphoned out. Another case arose from the failure of the sough, into which the waste pipe for the blow-out at the bottom of the boiler discharged. On the attendant's opening the blow-out the brickwork blew up, and he was unable to get within reach to close the tap, so that the furnace-crowns were laid bare and became overheated. In consequence, however, of the boiler being fitted with a low-water safety-valve, which let off the pressure of the steam on the water's falling below the proper level, the injury to the furnace-crowns was very trifling. Had blowing-out from the surface of the water been adopted instead of from the bottom, the furnace-crowns could not have been laid bare. These two cases of injury afforded an illustration of the advantage of the plan recommended by the Association of introducing the feed, as well as blowing-out, at the surface of the water, and it is thought that it would be well were this arrangement generally adopted.

For the present month Mr. Fletcher has to report three explosions, from which 15 lives have been lost, and also 25 persons injured. Not one of the boilers was under the charge of this association. The scene of the explosion has been personally visited in each case, and the cause investigated. The boiler which exploded in one of the instances was of the vertical furnace class, and heated by the flames passing off from three iron furnaces. These flames played in the first instance on the outside of the boiler, then passed through three neck openings into a central internal descending flue, and thence by means of a culvert to the chimney. Mr. Fletcher observes that this is a dangerous class of boiler. It is very inconvenient for complete examination, and the plates at the bottom, upon which it sits, may be seriously corroded without detection, unless the boiler is lifted from its seat. Also the intense flames from the reverberatory furnaces impinge directly

upon the shell externally, and the fires cannot be controlled as in an ordinary grate-boiler, while in addition, from its height and its being enveloped in brickwork, the best arrangement of water-gauge becomes inapplicable, as well as the fittings generally inconvenient and inaccessible. But not only is this class of boiler from these circumstances peculiarly liable to explosion, but, when it occurs, the consequences are peculiarly serious. The boiler standing erect is enveloped in a shell of brickwork some 15 or 20 ft. high, and surrounded by three or more furnaces, from the flames passing off from which it is heated. The temperature of these furnaces is very high, and their fire-brick lining, as well as the masses of iron with which they are charged, is frequently at a glowing white heat. When the boiler explodes its brickwork casing, as well as the furnaces, are demolished, and the debris is showered in every direction, so that more injury is done by the flight of the fragments, than by that of the boiler itself. When it is added to this that these boilers are frequently placed in the very heart of crowded works, and that, on account of the contiguity of the iron furnaces form which they are heated, numbers of workmen frequently surround them, it is thought that the dangerous character of these boilers will be somewhat apparent. The boiler was an old one, and had been repeatedly patched; while the edges of the plates where the fracture had taken place were reduced by corrosion for a considerable distance to the thickness of a sheet of paper. The position of the rents was below water line. This corrosion, which had taken place externally at the side of the boiler, as well as at the tippet-plate at the bottom on which the boiler was seated, was due to leakage, and must have been going on for a considerable time, while the greater portion of it could have been detected by competent inspection in the external flue. The explosion, in short, resulted simply from the delapidated condition of the boiler. In another case the jury brought in a verdict of "Accidental Death," attributing the explosion to over-pressure of steam, consequent on the imperfect condition of the safety-valve, appending to their verdict a recommendation to the effect:—That a legislative enactment should be passed compelling boiler-makers to stamp on their boilers the pressure at which they might safely be worked; and, further, that the Act should allow none but properly-educated and licensed engineers to have charge of engines and boilers, and, in addition, should provide for the periodical examination of all boilers by duly qualified inspectors.

Ironworks appear to maintain their position at the head of the list, both for the number and fatality of their explosions, and, under these circumstances, it may not be unwise to re-consider the policy now generally adopted at these works—that of employing the more primitive description of engineering arrangements, in preference to those of a more modern character, and now widely adopted in other branches of industry. True economy in engineering matters is only to be found in the employment of the best material and workmanship. Where boilers of a superior class have been adopted, they have been found to be productive of great economy of working, as well as of human life, and there can be no reason to doubt that these advantages would follow their general adoption at ironworks. A very frequent source of explosion, and one by no means peculiar to any particular class of works, is that of having no spare boilers, so that the Sunday becomes the only day for examination and repair, when the time is too short for either to be satisfactorily done, and thus the boilers are worked on in a dangerous state. Apart from other considerations, which need not here be entered upon, the practice of Sunday work is bad engineering. Boilers are injured by being suddenly cooled; and should never either be emptied when hot, or filled with cold water. Examinations and repairs of the plates, if hastily done, are sure to be scamped, and patches temporarily and insecurely hung on with bolts get to be substituted for soundly riveted plates. A great many instances of this might be given. At one of the inquests consequent on the explosion of a boiler referred to above, it was stated by the workmen that the boilers were so hot on a Sunday that they could only remain in them for a short time, and frequently had to come out for fresh air. In another case, in which a boiler covered with bolted patches, as just described, exploded a short time since, the engineman informed Mr. Fletcher that the Sunday was his regular day for getting inside his boiler and going up the flues, when the heat was more than he could bear for any length of time, yet the poor man was committed for manslaughter. The simple plan of having spare boilers, to allow time for examination and repairs, would prevent many explosions. It must not be lost sight of, that explosions do not occur to those who are careful in the management of their boilers, and, therefore, it may fairly be asked if the carelessness of those who allow their boilers to explode is just to the body of steam users as a whole? It cannot but be feared that the continued occurrence of these fatal explosions, will at length provoke the Government to undertake a system of inspection, and however wisely such a course may be carried out, it could hardly fail to prove irksome to the steam user, and to cramp the many careful for the careless few. It, therefore, becomes the duty of all owners of steam boilers either to have them examined by competent men of their own, or else to avail themselves of the periodical inspection of some independent and voluntary association, while, should there be no such association in their locality, they should then assist in establishing one—an effort which this association would gladly aid.

Immense Casting in America.—The 20-in. gun, cast at the Fort Pitt Foundry, Pittsburgh, was first suggested by Major Rodman in his report on the trial of the first 15-in. gun, and has long been a matter of theory. The length of the rough casting is 26 ft.; its maximum diameter 66 in.; and its weight 180,000 pounds. The length of the finished gun will be 20 ft. 3 in.; its maximum diameter 64 in.; and its weight 115,000 pounds. The diameter of the rough casting at the muzzel will be 4 feet, and that of the finished gun at the muzzle 34 in. The whole length of the bore is 210 in. The bore will terminate in a semi-ellipsoid, whose major axis will be 30 in., and whose minor axis will be 20 in. The mould consists of a flask (made in four pieces, bolted and clamped firmly together), and of the sand which it contains, which forms the matrix of the gun. The flask weighs twenty-eight tons, and the sand ten. The mould is made by placing the flask over a wooden pattern, having the form of the rough casting, and then ramming the sand between the pattern and the flask. The pattern is then withdrawn, the mould is "slicked," or smoothed over, and then washed with a black coating made of ground coal. The mould is then placed in an oven, and baked until it has the hardness of an ordinary soft red brick; this mass of sand was rammed, finished, blacked, and placed in the oven, by ten men, in twenty hours. The flask being removed from its ovens and clamped firmly together, is placed vertically in a pit, made for its reception. Thus disposed, the muzzle end of the mould is on a level with the mouth of the pit, and the centre line of the gun is perpendicular. The pit which receives the flask is 28½ feet deep, and 14 feet in diameter. Inside it, near the bottom, grate bars radiate like the spokes of a wheel. Underneath on the outside these flues communicate a draft. Another flue, leading from the top of the pit, carries off the smoke. The object is to maintain a strong fire around the flask. This is one of the precautions in the process of casting guns. The core is a long, hollow, cast-iron fluted barrel, hung vertically in the centre of the mould. It is exteriorly coated—firstly, by a coil of three-eighths inch rope, closely wrapped, and a mile in length; and, secondly, with a luting of stiff clay, which is put on to separate the cast iron of the barrel from the molten iron of the gun. The rope is used to keep the clay out of the grooves, and, by presenting a rough surface, to prevent it slipping off. The grooves allow the gas (mainly hydrogen), formed by the contact of the melted metal and the clay, to escape freely at the upper end into the air, where it burns with quite a large flame. After the coatings are on, the core is likewise baked hard in an oven. Its outside diameter is 19 inches, one inch less than the finished diameter of the bore, thus allowing half an inch all round for the completion of the latter. The core barrel is keep cool by means of a stream of cold water circulating throughout its whole length. A small pipe, extending almost to the bottom of the core, is traversed by the water, which rising fills the barrel, and passes off at the top. During the casting, the flow of water was sixty gallons per minute. Three large reverberatory or air furnaces are used. Two are of the capacity of twenty-five tons each. The third, of the capacity of forty tons, is believed to be the largest in the world. It was built expressly for this casting. It was charged with thirty-nine tons, and each of the smaller furnaces was charged with twenty-three and a half tons. From these furnaces the iron is conducted through iron troughs, lined with clay, into a common pool near the pit. Thence it is conducted by two troughs into the gates of the mould. These gates are two openings, 3 inches in diameter, extending all the way down the mould outside the matrix of the gun. They communicate with the gun proper by means of smaller gates, cut through at intervals of 15 inches, all the way up. The iron is then conducted first into the bottom of the mould, and then through the side-gates, respectively, up to the top, as the metal rises in the mould. The difference between the reverberatory and the cupola furnace is that in the former the fuel and iron are separate, and there is a natural draft through a large stack. In the latter, the fuel and iron are together and the draft is made by blast. Two cranes are used in lifting this heavy mould, and in taking the gun from the pit. They have each the capacity of forty tons. They are worked by the steam engine, which not only hoists and lowers the load, but likewise causes the cranes to revolve. The metal from which the gun is manufactured is the Juniata iron, from the Bloomfield-Juniata and Rodman furnaces. It has been once re-melted before being charged into furnaces for the gun. The iron from which it is constructed is thus all of one grade. The furnaces were fired at 5 A.M.; the metal was melted by 11 o'clock. Whilst the iron was running in the mould, it was constantly stirred by men with long poles of oak. The object of this was to relieve it of the gas often formed in gun-irons, and which, if not removed, creates globular cavities in the mass of the gun, and thereby destroys its uniformity. The casting commenced at twenty-four minutes after twelve. Eighteen bushels of coal were allowed to each ton of iron to make the fusion. The furnace No. 5 was first opened, and then the furnaces No. 6 and No. 4; four men with long, narrow puddling sticks, collected the scum and scoria which gathered on the surface of the liquid iron. Small quantities of iron where thrown into the pit from time to time, in order to light the gas which escaped from the sand through the small vent-holes in the flask. The gas escaping from within the iron pipe surrounding the core barrel was in a constant state of ignition, and formed a pale, luminous crown of blue flame; the last furnace was closed at 45½ minutes past 12, and the time occupied in the casting was 21½ minutes. The temperature of the stream of water was at the commencement, 36°; at the moment the casting was over, it stood at 42°; 4 minutes after the casting was over, it was at 52°; 8 minutes after the casting was over, at 75½°; 14 minutes after the casting, at 81½°; 20 minutes after the casting, at 89¼°; 25 minutes after the casting, at 91°; and 30 minutes after the casting, at 91¾°. Nothing went wrong. Furnace No. 6 was the first to be stopped, and the others, Nos. 4 and 5, were stopped almost immediately after. When the casting was completed a blacking, consisting of ground coal, was strewn over the top to prevent chilling. During the operation the gas escaped freely from the vent-holes in the flask, which is perforated in a thousand places, ⅛ inch in diameter. Three furnaces only were employed. A fourth furnace was in reserve, in case of any accident, but there was no necessity for its use. Only 2 or 3 tons were left over after the casting was completed. The fourth furnace in reserve had a supply of 10 tons, and a fifth 12 tons, which in any exigency might have been drawn upon. After the casting was over, the mould, not being completely filled, owing to the gradual settling of the liquid mass, was supplied with fresh liquid iron, or, in other words, the workmen "filled up the shanks." All the fuel employed was the Pittsburgh bituminous coal. The drawing of the core was to take place about 24 hours after the casting. In this operation the supply of water is suddenly stopped off. The barrel is much expanded by heat. A large strain is put on by the steam crane, almost sufficient to draw the barrel out on the re-admission of the water. The barrel cools quickly, shrinks with rapidity, the strain of the crane springs it out about 2 ft. and it is then drawn out. The buildings, cranes, furnaces, patterns, flask and lathe had to be entirely new-constructed, in order to accommodate themselves to the size of the gun. The lathe is 60 ft. long, 8 ft. wide over the shears, and is driven by two engines, 6-in. cylinders, 12-in. stroke. In the foundation there are 120,000 bricks. The costly nature of the gun may be appreciated when it is remembered that the lathe which merely turns and finishes it cost between $10,000 and $15,000. No statement can at present be given respecting the tenacity and hardness of the metal. It is to be remarked, that by the interior cooling principle adopted the hardest and best iron is that nearest the surface of the bore. The fact of the gun being cast hollow secures this. The iron of which the gun is cast was thoroughly tested, in the same manner as that of the first 15 in. The sample by which the gun is to be proved is to be taken from the sinking-head, or the rough end cut off from the muzzle. The powder used here is 13-16ths of an inch in diameter, and the gun will burn not less than 100 lbs. The gun is expected to be ready in the latter part of May, and the value is estimated at $30,000. The expense for each charge of the gun may be roughly placed at $75, allowing $25 for powder, and $50 for projectiles. Fifteen or sixteen men will be required to manage the gun when completed, nine being employed in the loading, and six or seven in traversing the gun. The solid shot will weigh 1000 lbs., the shell 775 lbs.—*Journal of the Franklin Institute.*

Thames Tunnel Company.—Receipts for the week ending April 9, 66*l.* 7s. 2d.; number of passengers, 15,926.

MINING IN AUSTRALASIA—MONTHLY SUMMARY.

[FROM OUR OWN CORRESPONDENT]

Melbourne, Feb. 25.—A new and very extensive gold field has during the last few months been brought into prominent notice. It is situated in the great dividing range of mountains between Melbourne and Gipps Land, and is known as Wood's Point. Located in the region of almost impenetrable scrub, the reefs in that district have been at present but partially tried. The returns, however, are larger than have ever yet been obtained in any other portion of the colony. The last crushing from the Morning Star reef produced from 36 tons of stone no less than 1581 ozs. 2 dwts. of pure gold, or nearly 44 ozs. to the ton. This was by no means an unusual yield, the claims having on this reef averaged from the commencement fully 20 ozs. to the ton, and that with the rudest and most inefficient machinery.

Another letter says—"The gold fields have maintained their reputation during the past month. Several very handsome nuggets have been found—one of 192 ozs. was got by some Germans near Maryborough; two were unearthed at Raywood, near Bendigo, weighing 168 ozs. and 62 ozs, respectively; another was found at Korong of 81 ozs., besides several smaller ones. The Ballarat deep leads continue to improve. The Koh-i-noor Company have got into some very rich ground. In one day lately they washed out 300 ozs., and in four days they obtained 943 ozs. One of their dividends during the month amounted to the large figure of 215*l.* per share, besides a reserve of 700*l.* Several of the other companies have also been very fortunate. Many of the quartz reefs are likewise proving very rich—in some cases 12 and 20 ozs. per ton are talked of. One crushing of 100 tons yielded 1700 ozs. of gold. At the Blue Mountains a crushing of 60 tons gave 400 ozs. It appears foom the gold fields statistics for the past year that the mean number of miners employed during the year was nearly 92,368, and the total quantity of gold exported 1,627,066 ozs., which, at 4*l.* per ounce, gives 70*l.* 9s. 2·436d. per man per annum; for 1862 it was 67*l.* 17s. 1·068d. per man; and for 1861 the rate per man was 74*l.* 15s. 11d."

Adelaide, Feb. 25.—Since the rise in copper at home, noted per last mail, a considerable advance is established, and both the Wallaroo and Burra Companies' prices are 99*l.* per ton at the Port. Galvanised iron is saleable at quotations. Wire has advanced, and is scarce at 16*l.* 10s. per ton.

The reports from the mines in the North continue very favourable from the Yudanamutana Mines. Section 135B, Henry's shaft, is yielding some rich black ore, from the 15. At the 20 the same lode is going down. Upon Section 135A, Mary's shaft the stopes are yielding their usual quantity of rich ore. A considerable quantity has been dispatched from this mine during the past month. Blinman Mine continues to yield ore in large quantities. There are several large piles of ore ready for the furnace. Smelting was commenced last week with the most satisfactory results. Five charges of 22 cwts. each were passed in 24 hours, and then some for regulus. It came out nearly pure metal. The ore is very easily fused. The sample sent down is from 80 to 90 per cent. The road for the traction-engines is steadily progressing. One of the engines, with workmen, is at the Willochra Creek, making a cutting to pass.—*South Australian Advertiser*, Feb. 26.

Talisker Mine.—News has arrived to the effect than a new lode, surpassing anything yet opened on this mine, was discovered and opened last week. It lies to the eastward of the company's offices, and has been traced some 50 yards. The new captain, Mr. W. H. Price, appears likely to give every satisfaction, being evidently determined to reduce the expenditure considerably, and at the same time increase the returns, so soon as the necessary preparations are completed. The latest assays of the shipments show a gradually increasing amount of gold in proportion to the depth attained, which, if continuing at the same rate, must greatly increase the value of ore in deep sinking. There is another metal found mixed with the ore, the nature of which has not yet been determined by the assayers here. The general impression is that it is nickel, and a button of it is to be forwarded to London to settle the point. The following is an extract from a communication of the captain's of the 18th inst.:—"I have to report the discovery of a new lode of silver-lead ore, made by myself yesterday, about 12 o'clock, when in about half an hour I raised 5 or 6 cwts. of carbonate and galena. This morning I put two men to uncover the lode, and by five this evening they had raised 10 cwts. The lode is at present 20 in. wide of solid ore. I have traced it for 100 yards. All the miners say it is the 'keenliest' lode in the mine."

Copper Smelting.—We hear that a new company has been formed in Sydney for the purpose of establishing copper smelting works at Newcastle, and that Mr. Mauris Thomas, late of Callington, has been appointed manager of the proposed works. South Australia, we believe, is looked upon as being the source from whence the principal supply of ore is to be derived. Mr. Thomas purposes taking his departure for Newcastle almost immediately, and upon arrival there to proceed with the erection of the necessary works.—*South Australian Register.*

AUSTRALIAN MINES.

Kapunda.—The quantity of ore raised in Dec. was 269 tons, of 18¼ per cent. average produce, equal to 49 tons of pure copper, exclusive of 20 tons of sulphur ore for flux. The quantity raised in Jan. is estimated at about 350 tons, wet weight, of good percentage. A very full and satisfactory report on all the shafts and underground works is also to hand. All was going on steadily at the smelting-works, the furnaces being in full work, and a good supply of fuel coming in. Since the date of the last advices 68 tons copper had been shipped per *Indus.*

Yudanamutana Copper.—The superintendent states:—"I have now the satisfaction to advise you of our having commenced smelting the poorer ores. I forward a sample of the metal, which I think will yield 90 per cent. of pure copper. I have shipped per *Elphinstone* 60 tons of ore, and there is now upon the road to port 114 tons, several tons of which is rich black ore. I have had several assays made of the ore at grass at Blinman, and find that it will give a much higher value than was put on it (54,998*l.*) The progress made with the traction-engines is very slow; there is much more cutting and levelling required on the road than was anticipated." Capt. Anthony reports, under date of Feb. 13.—"Blinman Mine: During the past month the Big Bunch has been quite as good as ever, both going down and in the north end. This place will yield an enormous quantity of smeltable ore, besides what is cartable without smelting. The bunch in ends of No. 2 shaft remains as it was last month, not having been worked, as we could not spare the men. We have now about 500 bags of ore awaiting cartage, and sent to port 45 tons. In glancing over the quantity of ore raised and the quantity sent to port, I consider we have now at surface a similar amount and value as shown in my last estimate. Since that time, however, we cut a good lode in No. 2 shaft (but which stands entire), which enhances the value of the mines very considerably. After smelting about 10 tons of ore, to saturate the bottom of the furnace, we found it necessary to stop, in order to line the stacks with bricks. We resumed smelting yesterday, and to-day, after running about 5 tons of ore, the furnace was tapped, and we had, instead of regulus, almost pure metal in the first operation. I am very pleased to state that the success of the smelting is beyond our most sanguine expectations. I have not been up to the Yudanamutana Mines this month. I am not a little annoyed that flying reports should have become the criteria by which to judge of your affairs in the colony. I would not over or under colour a report to please any man, and I stake my credit as a miner and man of business on every sentence I have written as the reporter of your mines."

Worthing.—The Bremer Mine continued to improve. The lode in the 53 south, at Legg's engine-shaft, was of immense size, yielding a great many tons of ore to the fathom. They had driven 5 fms. into it during the month, and had not yet seen the eastern wall. The 43, south of Legg's shaft, in No. 1 winze, was down 7 fms., the lode in the bottom yielding from 8 to 10 tons per fm. No. 2 winze was also going through a good course of ore. No. 4 winze was going down through good ore ground. The furnaces were again at work, and wood coming in fast. Ore raised and dressed during the month, 270 tons, of the average quality; expenses, 1203*l.* 12s. 9d. The captain and manager were, if possible, more sanguine than ever that the Bremer was a large, profitable, and lasting mine. The attention of the shareholders is directed to the 53 end south. This is the deepest level in the mine, and it is encouraging to observe the good appearance of the lode there. Capt. Prisk, in his last report, stated they had driven across the lode 7 fms.; he now mentions having extended the drivage 5 fms. further, and no eastern wall has been met with. It is, therefore, impossible to tell the exact size of the lode, but there is no doubt of its being of immense size, and carrying ore throughout it.

Great Northern Copper.—Mr. Charles Bonney reports—"The only work now going on being the sinking of the engine-shaft at Nuccaleena, I have little to communicate this month." Captain Garland reports—"We have sunk our engine-shaft about 2 fms., which is now down 10 fms. 3 ft. from bottom level. Our present price for sinking is 64*l.* per fm. The ground still continues much the same; if anything a little easier. As the ground now requires no timbering I hope they will sink more than 2 fms. a month, so that they will commence to cross-cut in April; and if all goes well cut the lode in May. A small lot of ore has just arrived at Port Adelaide, 110 cwts., which we shall sell here."

Wheal Ellen.—Mr. Alfred Hallett, the manager, reports that every endeavour is being made to push on the underground operations as fast as possible. The lode in the engine-shaft has been producing a little lead under the 30 fathom level, low in quality, but an improvement on anything seen in it since the works were resumed. A few stones of good yellow copper ore have been met with in sinking below the 30, on a caunter coming in from the south-west. The 40 end is within 3 fathoms of being under Squarey's engine-shaft; average sample of ore, lead 6½, silver 4 ozs. 9 dwts. Basset's shaft was all but ready for drawing water; a difficulty had occurred from the crushing of the ground, otherwise the water would have been out ere the date of advices; but Mr. Hallet expected to start the engine on March 1, and before next mail to give some account of the reserves below the water level. The result in smelting the undressed ores by the dry process appeared to justify the opinion that they could be so dealt with: 6 tons of a mixture of ores yielded 5 pigs of lead, the sample of the first tap giving 166 ozs. of silver and 2 ozs. of gold to the ton of pig lead. The evidence being so strong in favour of the process, preparations were made to make another trial on a larger scale.

English and Australian Copper.—The quantity of coal at Kooringa was 1180 tons, at Kapunda 438 tons, and at Port Adelaide and afloat 671 tons. There were six furnaces and one refinery at work at the port, and one furnace under repair. Since the date of the last advices about 84 tons of copper had been shipped to England. The company's teams were working extremely well, and doing all the cartage.

Port Phillip and Colonial Gold.—Mr. Bland (Clunes, Feb. 23) gives the result of January and February quartz crushing:—"We have but one fortnight's crushing during Jan., owing to causes explained in my last letter. During that period we crushed 1779 tons of quartz, which yielded 893 ozs. 3 dwts. of gold, being an average of 10 dwts. 1 gr. per ton. I am unable to draw out the usual return, owing to the broken period the stamps were at work. The receipts and expenditure were as follows:—Payments, January—Ordinary, 946*l.* 0s. 2d.; firewood account, 1008*l.* 8s. 9d.; new machinery, 190*l.* 3s. 3d.; dam and sluice, 106*l.* 16s. 9d.; total, 2251*l.* 8s. 11d. Receipts on stamps account, 1493*l.* 17s. 9d.; arrastre, repayment, labour, &c., 471*l.* 0s. 10d.; ditto, share profit, 166*l.* 2s. 8d.; balance, debit, 120*l.* 7s. 8d.; total, 2251*l.* 8s. 11d. The last month was the first for a very long period that the receipts did not meet the payments, there being a balance on the wrong side of 120*l.* 7s. 8d. This, however, is accounted for by the short period the stamps were at work, earning but a comparatively small sum during the whole month. However, all the mechanics and some of the labourers were employed effecting repairs; the payment on account of stock of firewood was also heavy, amounting to over 900*l.*, and that for the dam and new machinery was 297*l.* Return for February:—The return of quartz crushed for the current month is as follows:—Quartz crushed, 3266 tons; ditto per week, 814 tons; yield of gold, 1460*l.* 18s. 2d.; ditto per ton, 8·22.—Machinery: This has been working very well, and with but little interruption for repairs; two or three of the old batteries require attending to, which now that the stamps are at work will be taken in hand. The new stamps were got to work last Thursday, the tramway to them having only been completed the previous day. The whole plant works extremely well. There are a few stoppages just at first, as might be expected, to adjust the stamps, &c., but all will, no doubt, go smoothly in another week, when we shall be able to judge the amount of work they will get through. Remittance, 300*l.* I regret I cannot send a larger amount this month. The expenditure has been heavy, principally on firewood account, 2300*l.* having been expended for this during the three months ending the 20th instant; 500*l.* more will complete our stock for the engines for eighteen months. Everything connected with contracts and new machinery is paid for, with some trifling exceptions."

Fortune Copper.—Capt. Penberthy reports, Fremantle, Jan. 29:—The 40 is driving south-west of the old working shaft, by six men, at 9*l.* 10s. per fathom; this end for the past month has opened up some good ore ground—a lode 3 ft. wide, producing 2½ tons of copper ore per fathom. The north-east end, in the 40, is driving by four men, at 7*l.* 10s. per fathom; lode 18 in. wide, 12 of which are solid yellow copper ore. The stope in the back of this level, south-west of the shaft, is working by two men, lode 3 ft. wide, producing 2½ tons of copper ore per fathom, of good quality. The stope in the back of the 30, south-west of shaft, is working by two men; lode 3 ft. wide, producing 3 tons of copper and lead ores per fathom. The stope in the back of the 30, south-west of Samson's winze, is working by two men; lode 2 ft. wide, producing 1 ton of copper and 2 tons of lead ores per fathom. The stope in the bottom of the 20 is looking well—working by four men, at 4*l.* 7s. 6d. per fathom; lode 4 ft. wide, producing 3½ tons of copper and lead ores per fathom. The rise against the new engine-shaft, in the 30, is working by four men, and the shaft is sinking by nine men; the ground is hard, but I hope to complete it in two months and a half from the present date. We have dressed this month 26 tons of copper ore and 45 tons of lead ore; the latter is increasing, but without the slightest diminution in the quantity of copper ore.

Scottish Australian.—During the month 129¼ tons of ore have been raised from West Cadia; 117½ of these (containing rather over 12½ per cent. of copper), with 15 tons of low quality ores, previously stoped from Cadiangullong, have been sampled at the smelting-works, giving on assay 13¼ tons of fine copper. There have been dispatched from the smelting-works to Sydney 10¼ tons of copper. A further quantity of 10 tons would be dispatched in a few days, and 10 tons more by the end of the month. Advice of the shipment of 8 tons (part of the above) to London, per the *Duncan Dunbar*, has been received. The ore on hand at the smelting-works was 474¾ tons, besides 72½ tons at the mine. Great competition continued to prevail in the coal trade of the colony, and prices were still ruling low. The superintendent, Mr. Morehead, however, writes:—"As respects the character of the Lambton Colliery, and the quality of the coal it produces, everything is as satisfactory as well could be, as is testified by the various certificates and reports enclosed. . . . . . There are strong symptoms on the part of those who have done most to run down prices to unremunerative rates, of a desire to bring about a reverse movement, among those symptoms being a circular issued, inviting a meeting of colliery owners to fix a minimum price for coal." The various reports on the quality of the coal received from the persons who have tried it, both for steam and gas purposes, may be inspected at the office of the company.

FOREIGN MINES.

Copiapo.—Checo Mine: Estimated produce for February:—

Class.	Quantity.	Quality.	Price.	Value.
Second class dark ore	156	20	—	—
Third class ditto	228	12	—	—
Fourth class ditto	32	10	—	—
Second class green ditto	118	12	—	—
Third class green ditto	10	10	—	—
Total	544	14·14	Rls. 9·65½	$654

In the 60, east of Price's shaft, the lode driving east is still the same as when last reported; the ground is hard for driving; driven since our last report 1·73 metres. In the chiflon sinking east the lode at present is very small and poor. We shall now commence to sink west from the bottom of the same, as we think the lode may improve under the hard slide; sunk since our last report 2·61 metres. In the 60, No. 2 chiflon, sinking west, the ground is very hard for sinking, and the lode very poor; sunk since our last report, 1·40 metres. In the 50 fm. level, east of Price's shaft, the lode driving west is producing some good stones of ore, but not to value; driven since our last report, 2·63 metres. In the 50 chiflon, sinking west, there is no alteration since our last report; the ground is still very kindly; sunk since our last, 3·20 metres. In the 40, west of Price's shaft, the lode is very changeable; at present it is 2 ft. wide, composed of black spar and mundic, a very promising lode; sunk since our last, 3 metres. In the 40 winze, west of Price's shaft, the lode is looking somewhat more favourable than when last reported; sunk since our last report, 3·30 metres. In the 60, at Price's shaft, the ground at the shaft is still hard for sinking; sunk since our last report, 4·41 metres. In the 80, at Harman's shaft, the ground in the cross-cut is still hard for driving this stope, and shall remove the men to some other place in about the centre of the mine, as we are convinced that there is no more of the main south lode in the sides; driven since our last report, 1·51 metres.—Western Sett: In the 10, east of new shaft, the lode is much the same as when last reported—poor; sunk since our last report, 3·09 metres. In the 30, at new shaft, the underlie of the lode being so much we are obliged to leave the lode one side of the shaft, but it may in depth come out in the shaft again. The ground is still very favourable for metal; sunk since our last report, 3·55 metres. In No. 2 chiflon, sinking east, the lode is still poor; sunk since our last report, 3 metres. Total metres, 33·43.—G. Matthews.

Dulcinea Mine.—Estimated produce for February:—

	Class.	Quantity.	Ley.	Price.	Value.
Jan.	Second class	Qtls. 839	21	Rls. 17·25	$2327
„	Third class	572	12	7·25	
Feb.	Second class	912	21	17·25	2506
„	Third class	640	12	7·25	
	Total	2963			$4833

The bottom chiflon south has been sunk 4 metres during the present month; lode 2 ft. wide, yielding 2½ tons of ore per metre. The bottom chiflon north has been sunk in the present month 4 8-10ths metres; lode 2½ ft. wide, giving 2½ tons of ore per metre. In the bottom stope, 7 metres long, between the two bottom chiflons, 15 metres has been stoped during the present month, yielding 2½ tons of ore per metre. The 25 fm. level south has been driven 3 8-10th metres during the present month; lode 1½ foot wide, giving from 1 to 2 tons of ore per metre. The cross-cut winze has been sunk 3 metres during the present month; ore has been discovered within this half month; lode 1½ ft. wide: this gives us reason to hope that we have some 30 metres in length of good orey ground from the winze south to the bottom stope. The new chiflon, from surface, north end of sett, has been sunk 2½ metres since the 15th inst., producing stones of copper ore. In January, the ground has been stoped 31 metres. In February, ground stoped, sunk, and driven through, 64·1 metres.—John Laws.

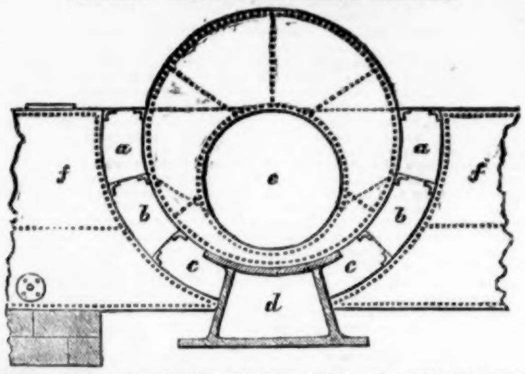
Lusitanian.—March 29: Palhal Mine—Basto's Lode: The lode in Taylor's diagonal engine-shaft, below the 80, is worth 3 tons per fathom. In the 80, east of Taylor's shaft, we have cut the caunter lode, which has caused Basto's lode to be very unsettled. In the 80, west of same shaft, the lode is 2 ft. wide, composed of schist and flookan. In the 70, east of Taylor's, the lode is 2 ft. wide, with a branch of ore worth ½ ton per fathom. The lode in the 70, west of Taylor's, is 1½ ft. wide, composed of quartz and a branch of ore, worth ½ ton per fathom. In the 60, west of same shaft, the lode is worth 1½ ton per fathom. The lode in the 50, west of slide lode, is split into small strings, none of which are productive. In the 50, west of Taylor's, the lode is worth ½ ton per fathom. The lode in the 38, west of slide lode, is 2½ ft. wide, composed of quartz, gneiss, and stones of ore. The lode in the 18, west of Perez' shaft, is 1½ ft. wide, worth ¾ ton per fathom. In the 8, west of same shaft, the lode is 1 ft. wide, producing stones of ore. No. 1 stopes, west of Francisco's shaft, are worth 1 ton per fathom. No. 3 stopes, west of Perez' shaft, are worth ¾ ton per fathom. No. 5 stopes, east of Patricio's winze, are worth 1 ton per fathom. No. 6 stopes, east of River shaft, are worth ¾ ton per fathom. No. 8 stopes, east of Ball's winze, are worth 1½ ton per fathom. No. 9 stopes, west of Joaquin's winze, are worth 1 ton per fathom. No. 10 stopes, west of River shaft, are worth 1 ton per fathom. No. 12 stopes, west of Joaquin's winze, are worth 1½ ton per fathom. No. 16 stopes, west of Norte's winze, are worth 1½ ton per fathom. No. 17 stopes, east of Nunes's winze, are worth 2 tons per fathom. No. 16 stopes, east of Taylor's, are worth 1 ton per fathom. No. 19 stopes, west of Patricio's winze, are worth ¾ ton per fathom. No. 20 stopes, east of Norte's winze, are worth 1½ ton per fathom. No. 21 stopes, east of Taylor's, are worth 2 tons per fathom. No. 23 stopes, west of Penes's winze, are worth 1 ton per fathom. No. 24 stopes, east of Mill lode, are worth 1 ton per fathom. The lode in Serefina's winze is worth ¾ ton per fathom.—Mill Lode: No. 22 stopes, west of River shaft, are worth ¾ ton per fathom. No. 15 stopes, between the caunter and slide lodes, are worth ¾ ton per fathom. No. 2 stopes, west of Machado's winze, are worth 1 ton per fathom.—Caunter Lode: The lode in the 60, driving east of slide lode, is 2½ ft. wide, with a branch of ore worth 1½ ton per fathom. The lode in Jacintro's rise is worth 2 tons per fathom. The lode in the 50, east of Machado's winze, is worth ½ ton per fathom.—Great Caunter Lode: No. 14 stopes, west of slide winze, are worth ½ ton of lead per fathom. No. 13 stopes, west of Martinez' winze, are worth ½ ton per fathom.—Slide Lode: The lode in the 28, west of Mill lode, is 2 ft. wide, composed of quartz and a little flookan, with stones of ore and mundic. The ground in the back of engine-shaft is just as it has been for some time past. We hope to finish this sinking to the 50 fm. level by the end of this week, after which we shall cut a plat.—Carvalhal Mine: The lode in the adit level, west of incline shaft, is 4 ft. wide, composed of quarz, and is letting out much water. The lode in the adit level, west of the River Caima, is 8 inches wide, of quartz.

Central American.—Feb. 29: San Pantaleon Mine: At Cornubia engine-shaft the ground is a little improved for sinking; the lode is 1 foot wide, composed of flookan, calc-spar, and a little mundic. At Taylor's engine-shaft the ground is harder. At this point we have 3 feet more to sink to get down to the San Alfonso deep adit level; when this is accomplished, we shall immediately commence to drive west from this shaft towards the deep adit. In the San Alfonso, or 40 fm. level, driving east of Cornubia engine-shaft, the lode has been unproductive; we have intersected the No. 2 cross-course, and have set the men to drive north to find the lode on the eastern part of this cross-course. In San Felipe, or 30 fm. level, driving east of the No. 2 cross-course, the lode is a little improved; it is now 18 in. wide, and worth 3 cwts. of low-quality silver ore per fm. In San Ricardo, or 20 fm. level, east of the No. 2 cross-course, the lode is split into branches, out of which we have in the past month taken a few cwts. of silver ore of good quality. In San Hilario, or the shallow adit, the lode driving east is from 2 to 4 feet wide, worth 2 or 3 cwts. of good quality silver ore per fm. The lode in No. 3 winze is 15 in. wide, with a small branch of low-quality silver ore, worth of the latter 3 or 4 cwts. per fm. Not having air to go down any further, we suspended this winze, and put the winze men to rise above San Alfonso, or 40 fm. level, where the lode is 8 in. wide, worth 2 cwts. of good quality silver ore per fathom. The lode in No. 9 stopes, below San Juan, west of No. 1 winze, is worth 6 cwts. of silver ore per fathom. The lode in the stopes No. 7, below Dolores adit level, east of Cornubia engine-shaft, is 20 in. wide, worth 10 cwts. of ordinary quality ore per fm. The lode in the winze sinking below San Felipe level, east of Cornubia engine-shaft, is 1 foot wide, composed of soft porphyry and flookan, but unproductive; this winze we are sinking to prove the lode, and to ventilate the 40. We have commenced a new stope below San Ricardo level, east of No. 2 winze; here the lode is worth from 8 to 10 cwts. of good quality silver ore per fathom.

San Antonio Mine—Ellery's Whim-shaft: The lode in San Ramon adit level, east of No. 1 cross-course, is 1 ft. wide, composed of flookan and a small branch of silver ore, of ordinary quality, worth of the latter 3 cwts. per fathom; the lode in this level is going in a very good position. The lode in the No. 1 stopes, above San Ramon level, west of Mestum's winze, has greatly fallen off in quantity, now worth 5 cwts. of silver ore per fathom, but of low quality. The lode in the new stope (No. 4), east of No. 1 cross-course, is 1 ft. wide, composed of flookan, mundic, and silver-lead ore, worth of the latter 15 cwts. of low quality silver ore per fathom. In about a fortnight more we shall be east from Ellery's shaft about 6 or 8 fms., when we shall commence to cut a plat at the San Faustino, or 10 fm. level, below San Ramon adit, preparatory to sinking the above-mentioned shaft.

— March 2: I am again pleased to state that the various operations have been duly and satisfactorily carried out during the month just ended. The ore returns from the mines have exceeded the estimated amount, showing a total of 132 tons 17 cwts., at an average assay of 87 9-10 ozs. of silver per ton. With the exception of an improvement in the eastern end of San Felipe, or 30 fm. level, no change worthy of note has occurred in the deep part of the mine of San Pantaleon. The stopes, however, in some instances proved more productive. The present month's returns are calculated at only 122 tons, owing to the Easter holidays. It will be seen from the progress making in the San Alfonso level that the highly important object of communicating with the eastern workings by means of this deep adit will, ere long, be effected. A conducta, with about thirty bars of silver, will be dispatched for the Mint of Guatemala, on or about April

PATENT FLUE AND TANK BOILER.



JEWELL'S PATENT FLUE AND TANK BOILER
A PLAN FOR ECONOMISING THE CONSUMPION OF FUEL IN STEAM BOILERS.

The advantages of this boiler, an illustrated description of which was published in the MINING JOURNAL of October 3, are obvious.

It is provided with WROUGHT IRON FLUES, conveying the fire entirely over the surface of boiler below the water line, and wholly doing away with lime coming in contact with any part of the boiler, lime having been found to destroy the boiler plates before any other parts are the worse for wear. This boiler has four additional flues to the plan at present adopted, thus affording a FAR GREATER AMOUNT of HEATING SURFACE, and MORE EFFECTUALLY CONSUMING the GASES. Between the boilers a wrought-iron tank is fixed, extending the whole length of the boilers, for containing water for feed; this water will pass into the boiler at any temperature required. This boiler will not require anyone to enter the flues for cleansing, as the flues are provided with shifting stoppers at the ends, enabling a person to cleanse the flues even while the boiler is hot; this plan answers for any size or length boiler, and will do away with the cold water feed, which has been the cause of so many accidents. These flues are made of wrought or cast-iron. On the top of the tank a pipe will be placed, to take the waste steam that escapes and carry it to the cistern. The flues for a 6 ft. boiler will be 2 ft. long, and the usual width. It must be remembered that the tank once hot will remain a hot body, with the same amount of heat that passed off before in the brick flues. I would observe that there will be no more water taken from these tanks than will be required for feed, consequently no more cold water will pass into these tanks than will be necessary for feeding. It is believed this plan will SAVE TEN FEET in the LENGTH of BOILER, and it has been proved to EFFECT a SAVING of rather MORE than ONE-THIRD in the CONSUMPTION of FUEL. These boilers, with flues and tanks, can be supplied on the most reasonable terms.

NOTE.—This plan of Flues and Tank Boiler will be found very beneficial for MARINE ENGINES; the tank would receive the water from the sea, and would not only become hot for feed, but would be the means of preventing in a great measure the salt from passing into the boiler. Where great quantities of hot water are required for other purposes, these tanks will also be found very beneficial. JOHN JEWELL.

Basset Foundry, Devoran, September 30, 1863.

_ Mr. JEWELL is PREPARED to GRANT the ROYALTY to any parties, for certain districts of the United Kingdom.

CREASE'S PATENT EXCAVATING MACHINERY,
for SUPERSEDING the SLOW and EXPENSIVE USE of MANUAL LABOUR in SINKING SHAFTS, DRIVING LEVELS, TUNNELLING, &c., is guaranteed to drive through any rock of average hardness at a minimum rate of 1 fm. per diem, and to sink shafts at the rate of 2 fms. in three days.

Mr. CREASE will undertake contracts for sinking shafts, driving levels, &c., at an enormous reduction of time and great saving in cost.

Applications to be addressed (for the present) to the patentee, Mr. E. S. CREASE, Tavistock, Devon.

By providing the power of calculating the time and cost to explore a certain depth and extent of ground, speculation in mining will be assimilated to commercial pursuits, with this unmistakable advantage—that when the ground has been once carefully and judiciously selected, and operations properly and systematically carried out for its development, there would be far less chance of unsatisfactory results than are met with by merchants and manufacturers in the usual routine of their business. As this important invention must beneficially interest the landowners, mine proprietors, merchants, and miners, we opine it will meet with immediate adoption.—*Mining Journal.*

BASTIER'S PATENT CHAIN PUMP.
APPARATUS FOR RAISING WATER ECONOMICALLY, ESPECIALLY APPLICABLE TO ALL KINDS OF MINES, DRAINAGE, WELLS, MARINE, FIRE, &c.

J. U. BASTIER begs to call the attention of proprietors of mines, engineers, architects armers, and the public in general, to his new pump, the cheapest and most efficient ever introduced to public notice. The principle of this new pump is simple and effective, and its action is so arranged that accidental breakage is impossible. It occupies less space than any other kind of pump in use, does not interfere with the working of the shafts, and unites lightness with a degree of durability almost imperishable. By means of this hydraulic machine water can be raised economically from wells of any depth; it can be worked either by steam-engine or any other motive power, by quick or slow motion. The following statement presents some of the results obtained by this hydraulic machine, as daily demonstrated by use:—

1.—It utilises from 90 to 92 per cent. of the motive power.
2.—Its price and expense of installation is 75 per cent. less than the usual pumps employed for mining purposes.
3.—It occupies a very small space.
4.—It raises water from any depth with the same facility and economy.
5.—It raises with the water, and without the slightest injury to the apparatus, sand, mud, wood, stone, and every object of a smaller diameter than its tube.
6.—It is easily removed, and requires no cleaning or attention.

A mining pump can be seen daily at work, at Wheal Concord Mine, South Sydenham, Devon, near Tavistock; and a shipping pump at Woodside Graving Dock Company (Limited), Birkenhead, near Liverpool.

J. U. BASTIER, sole manufacturer, will CONTRACT to ERECT his PATENT PUMP at HIS OWN EXPENSE, and will GUARANTEE IT FOR ONE YEAR, or will GRANT LICENSES to manufacturers, mining proprietors, and others, for the USE of his INVENTION.

OFFICES, 47, WARREN STREET, FITZROY SQUARE.

London, March 21, 1859. Hours from Ten till Four. J. U. BASTIER, C.E.

Now ready, price 5s.

STATISTICS OF AND OBSERVATIONS UPON THE MINES
OF CORNWALL AND DEVON.

For 1861, 1862, and 1863.

By THOMAS SPARGO, Mining Engineer, Stock and Sharebroker, Gresham House, Old Broad-street, London, E.C.

This work contains the following particulars, viz.:—The geological position, present prospects, name of purser, manager, and secretary, with annual returns of each mine during the last three years, and total dividends paid to the present time.

It is illustrated by a map of Cornwall, showing its parliamentary division, and population; geological district maps, divided into four sections, in which are shown the boundary lines of each parish, height of hills, source of rivers, &c., together with maps of St. Just, St. Ives, Marazion, Gwinear, Chiverton, Bodmin, Liskeard, Devon Great Consols, and Tavistock mining districts, showing boundary lines of each sett, with the lodes, elvans, and cross-courses traversing the same. It also contains longitudinal and transverse sections of the Dolcoath Mine (kindly supplied by Capt. Charles Thomas), with report upon the same; sections of the workings at Botallack, corrected down to the present time by the manager (S. H. James, Esq.), with historical account of same; surface plans and sections of all the leading mines in both counties, with observations upon each, including geological map of the Fowey Consols district (kindly furnished by Major Davis, R.M.), as also all the information necessary for the guidance of those unacquainted with mining.

THE MINING REVIEW, AND JOURNAL OF COMMERCE, TRADE AND MANUFACTURE, SCIENCE AND THE ARTS.

Published every Wednesday. Subscription, £1 1s. annually. Price 6d. stamped.

RAILWAYS AND MINES.
Capitalists who seek safe and profitable investments, free from risk, should act only upon the soundest information. The market prices for the day are for the most part governed by the immediate supply and demand, and the operations of speculators, without reference to the *bona fide* merits of the property. Railways depend upon the traffic, expenditure, and capital accounts, the probabilities of alliance or competition with neighbouring companies, the creation of new shares, the state of the money market as affecting the renewal of debentures, and other considerations founded on data to which those only can have access who give special attention to the subject. Mines afford a wider range for profit than any other public securities. The best are free from debt, have large reserves, and pay dividends bi-monthly varying from £15 to £25 per cent. per annum. Instances frequently occur of young mines rising in value 400 or 500 per cent. But this class of security, more than any other, should be purchased only upon the most reliable information. The undersigned devote special attention to railways and mines, afford every information to capitalists, and effect purchases and sales upon the best possible terms. Thirty years' experience in mining pursuits justifies us in offering our advice to the uninitiated in selecting mines for investment; we will, therefore, forward, upon receipt of Post-office order for 5s., the names of six dividend and six progressive companies that will, in our opinion, well repay capitalists for money employed.

Messrs. TREDINNICK AND CO., STOCK and SHAREBROKERS, and DEALERS IN BRITISH MINING SHARES, 78, LOMBARD STREET, E.C.

THE MECHANICS' MAGAZINE, AND JOURNAL OF THE
APPLIED SCIENCES.—Established 40 years.

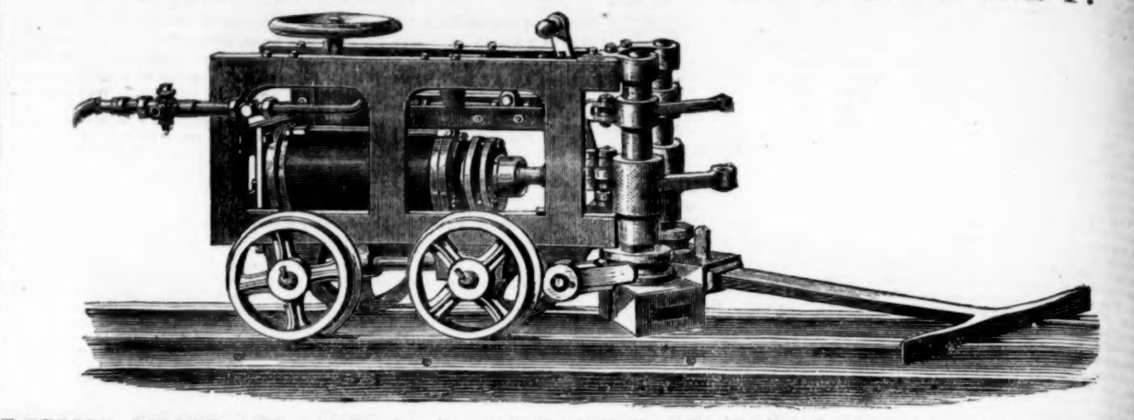
The Mechanics' Magazine has from its establishment had an extensive circulation, and it communicates, for 4d. per week, far more valuable information, both scientific and practical, than was ever before placed within the reach of even those who could afford to pay six times as much for it.—*Lord Brougham.*

Published weekly, price 4d., by post 5d. London: 166, Fleet-street, E.C.

THE BUILDING NEWS.—
An Illustrated Journal, price 4d., devoted to Architecture, Civil Engineering, the Arts of Design and Building. It contains original and practical Essays on Fine Art and on the Principles and Practices of Construction, Notices of New Buildings in all parts of the kingdom, Reports of Architectural and Scientific Societies, Notes on Church Decorations, Memorials and Stained Glass; Sanitary, Gas, Water, and other Intelligence; Improved Dwellings for the Working Classes; Lists of Tenders received, and of Competitions and Contracts open; suggestions (oftentimes illustrated) on subjects specially interesting to Architects, Builders, Contractors, and their Employees; correct weekly lists of all new patented inventions connected with every branch of the building trade, and a variety of interesting miscellaneous matter.

London: 166, Fleet-street, E.C.

COAL CUTTING BY MACHINERY.

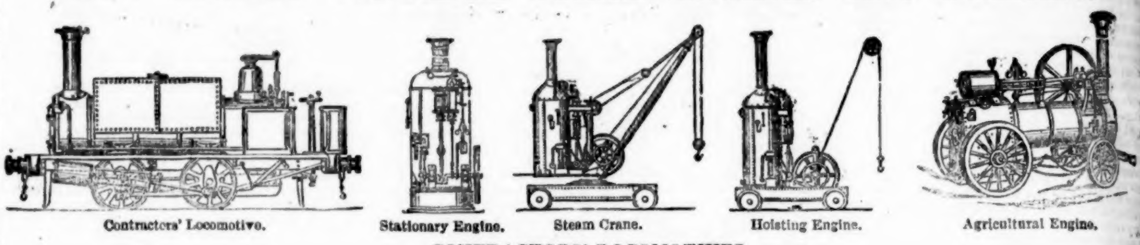


MESSRS. RIDLEY AND JONES have, by recently PATENTED IMPROVEMENTS, COMPLETED their TRUNK COAL CUTTING MACHINE, WORKED by COMPRESSED AIR, and are NOW PREPARED to NEGOCIATE for the USE, and to SUPPLY MACHINES, which will be found to COMBINE SIMPLICITY of CONSTRUCTION with PORTABILITY and ECONOMY in WORKING. By the use of these machines a CONSIDERABLE SAVING of COAL is EFFECTED, and the COST of LABOUR MUCH REDUCED. Each machine will be guaranteed as to its capabilities, &c.

All applications to be made to Messrs. RIDLEY and JONES, No. 11, South-street, Finsbury, London, E.C.

_ COLLIERY PROPRIETORS are CAUTIONED against PURCHASING or USING MACHINES, the construction of which will constitute an INFRINGEMENT of the ABOVE PATENT.

NEW PATENT PORTABLE STEAM ENGINES AND BOILERS.



Contractors' Locomotive. Stationary Engine. Steam Crane. Hoisting Engine. Agricultural Engine.

CONTRACTORS' LOCOMOTIVES.

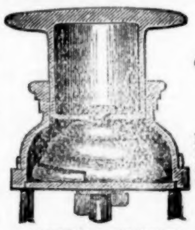
Prices complete, delivered free in Glasgow, Hull, Liverpool, or London.

6 horse power, pair of cylinders	4½ in. diameter	× 9 in. stroke	£300	15 horse power, pair of cylinders 7½ in. diameter × 14 in. stroke	£500
9 " "	5½ "	× 11 "	350	21 " " 8½ " × 14 "	600
12 " "	6½ "	× 13 "	450	27 " " 9½ " × 16 "	7[illegible]

Prices of STATIONARY ENGINES, STEAM CRANES, HOISTING ENGINES, AGRICULTURAL, PUMPING, and OTHER ENGINES on application.

J. B. BROWN AND CO., 18, CANNON STREET, CITY, LONDON, E.C.

THOMAS TURTON AND SONS,
MANUFACTURERS OF



CAST STEEL for PUNCHES, TAPS, and DIES, TURNING TOOLS, CHISELS, &c.

CAST STEEL PISTON RODS, CRANK PINS, CONNECTING RODS, STRAIGHT and CRANK AXLES, SHAFTS, and FORGINGS of EVERY DESCRIPTION.

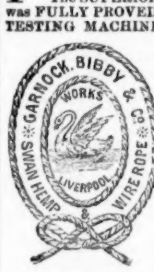
DOUBLE SHEAR STEEL, BLISTER STEEL, SPRING STEEL, GERMAN STEEL. | FILES MARKED T. TURTON. EDGE TOOLS MARKED WM. GREAVES & SON.

Locomotive Engine, Railway Carriage and Wagon Springs and Buffers.

SHEAF WORKS AND SPRING WORKS, SHEFFIELD.

LONDON WAREHOUSE,—35, QUEEN STREET, CANNON STREET, CITY, E.C. where the largest stock in the world may be selected from.

PUBLIC TEST OF WIRE-ROPE.—
The SUPERIOR QUALITY of GARNOCK, BIBBY, AND CO.'S WIRE-ROPE was FULLY PROVED by a RIVAL MANUFACTURER at the LIVERPOOL PUBLIC TESTING MACHINE, on the 29th of October, 1860, on which occasion GARNOCK, BIBBY, and Co.'s ropes were found to be the STRONGEST of all the TWELVE SAMPLES from different makers then tested, as reported in the papers of the day. For example:—



(Certified by Mr. William Macdonald, superintendent.)

Sizes.	Garnock, Bibby, and Co. Tons c.		Corresponding sizes from other manufacturers. Tons c.		Tons c.	
3½ in.	18	5*	16	10	11	10
2½ in.	8	15*	7	15	5	0

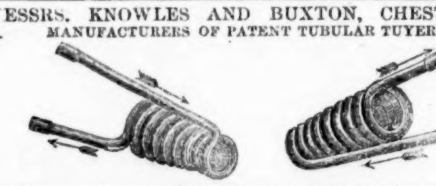
Remaining sizes with similar results.

* Samples taken promiscuously from stock by a rival manufacturer's agent.

GARNOCK, BIBBY, AND CO., SWAN HEMP AND WIRE ROPE MANUFACTURERS, LIVERPOOL.

FLAT and ROUND STEEL and IRON WIRE ROPES for MINES, &c., of SUPERIOR QUALITY.

MESSRS. KNOWLES AND BUXTON, CHESTERFIELD.
MANUFACTURERS OF PATENT TUBULAR TUYERES.



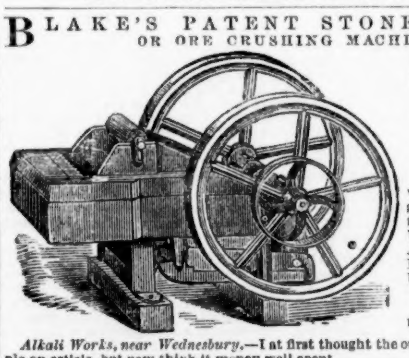
The PATENT TUBULAR TUYERE possesses GREAT ADVANTAGES over the ORDINARY TUYERES, both for its DURABILITY and EASY WORKING. A current of cold water going direct to the nozzle prevents their destruction, however much they may be exposed to the fire.

We repair them at half the first cost, making them equal in size to new ones, all parties returning them carriage paid.

No. 1 tuyere,	16 in. long	28s. each.
No. 2 "	18 "	32s. "
No. 3 "	20 "	36s. "
No. 4 "	22 "	40s. "
No. 5 "	24 "	44s. "

Delivered at Chesterfield station. Terms, nett cash quarterly.

BLAKE'S PATENT STONE BREAKER,
OR ORE CRUSHING MACHINE.



FOR REDUCING TO SMALL FRAGMENTS ROCKS, ORES, AND MINERALS OF EVERY KIND.

It is rapidly making its way to all parts of the globe, being now in profitable use in California, Washoe, Lake Superior, Australia, Cuba, Chili, Brazil, and throughout the United States & England.

Read extracts of testimonials:—

Alkali Works, near Wednesbury.—I at first thought the outlay too much for so simple an article, but now think it money well spent. WILLIAM HUNT.

Welsh Gold Mining Company, Dolgelly.—The stone breaker does its work admirably, crushing the hardest stones and quartz. WM. DANIEL.

Our 15 by 7 in. machine has broken 4 tons of hard winstone in 20 minutes, for fine road metal, free from dust. Messrs. ORD and MADDISON, Stone and Lime Merchants, Darlington.

Kirkless Hall, near Wigan.—Each of my machines breaks from 100 to 120 tons of limestone or ore per day (10 hours), at a saving of 4d. per ton. JOHN LANCESTER.

Ovoca, Ireland.—My crusher does its work most satisfactorily. It will break 10 tons of the hardest copper ore stone per hour. WM. G. ROBERTS

General Frémont's Mines, California.—The 15 by 7 in. machine effects a saving of the labour of about 30 men, or $75 per day. The high estimation in which we hold your invention is shown by the fact that Mr. Park has just ordered a third machin this estate. SILAS WILLIAMS

For circulars and testimonials, apply to—

H. R. MARSDEN, SOHO FOUNDRY, MEADOW LANE, LEEDS.

Only maker in the United Kingdom.

International Exhibition, 1862—Prize Medal.

JAMES RUSSELL AND SO
(the original patentees and first makers of wrought tubes), of the CROWN PATENT TUBE WORKS, W NESBURY, STAFFORDSHIRE, have been AWARDE PRIZE MEDAL for the "good work" displayed in t wrought-iron tubes and fittings.

Warehouse, 81, Upper Ground-street, London, S.

Prize Medal, International Exhibition, 1862.

RUSTON, PROCTOR, AND CO.'S CELEBRAT
PRIZE PORTABLE ENGINES are SPECIALLY ADAPTED for WIND PUMPING, SAWING, &c. These gines have, in public competition, w highest honours. For ECONOMY WORKING, LARGE ALLOWANC POWER in CYLINDER AREA PROPORTIONATE SIZE of BOIL STRENGTH of CONSTRUCTION, HI FINISH, and GENERAL EFFICIE they are unrivalled, having recently AWARDED THIRTEEN GO SILVER, and BRONZ PRIZE MEDALS, And numerous other priz

Messrs. A. Knowles and Sons w

Pendlebury Colliery, near Manchester, June 5, 18

GENTLEMEN,—We beg to inform you that we have now in use the portable e 8 horse power you supplied us with, and have great pleasure in informing you th works well, and we are much pleased with the workmanship and finish of it.

We are, yours respectfully, ANDREW KNOWLES AND SO

Illustrated, descriptive, and priced catalogues may be had on application to the Ironworks, Lincoln.

THE NEWCASTLE CHRONICLE AND NORTHE
COUNTIES ADVERTISER. (ESTABLISHED 1764).

Published every Saturday, price 2d., or quarterly 2s. 2d.

THE DAILY CHRONICLE AND NORTHERN COUNTIES ADVERTISE

Published every morning, price 1d.

The best medium for mining, manufacturing, shipping, and trading advertis the North of England.

Offices, 42, Grey-street, Newcastle-upon-Tyne; 50, Howard-street, North Shie 195, High-street, Sunderland.

Works published at the MINING JOURNAL *office, 26, Fleet-street, Lon*

PRACTICAL TREATISE ON MINE ENGINEERING. By G. C. GREENWELL one vol., half-bound, £2 15s.; whole bound in Morocco, £3 10s. In two vols, bound, £3 3s.
TREATISE ON IRON METALLURGY. By S. B. ROGERS. £1 5s.
STATISTICS OF MINING (ANNUAL). By W. H. CUELL. 6d.
"CORNISH NOTES"—NEW SERIES. By J. Y. WATSON, F.G.S. 1s.
RISE AND PROGRESS OF MINING IN DEVONSHIRE. By G. CHOWEN. 1s.; by post, 1s. 1d.
NEW GUIDE TO THE IRON TRADE, OR MILL MANAGERS' AND STOCKTAKERS' ASSISTANT. By JAMES ROSE. 8s. 6d.
STOCKTAKERS' ASSISTANT AND OFFICE COMPANION. By J. PARK. 7s. 6
MINING AND SMELTING MAGAZINE. Monthly. 1s.
CORNWALL AND DEVON MINING DIRECTORY. 1s. 6d.
VENTILATION OF MINES, FOR THE USE OF UNDERGROUND MANAGERS AND OVERMEN. By RALPH MOORE. 5s.
SECTION OF LANARKSHIRE COAL MEASURES (NEW EDITION). By RALPH MOORE. 10s. 6d.
MINERS' MANUAL OF ARITHMETIC AND SURVEYING. By WM. RICKARD. 10s. 6d.; by post, 11s.
TRANSACTIONS OF THE NORTH OF ENGLAND INSTITUTE OF MINING ENGINEERS. Eleven volumes: 21s. per volume. [Single copies can be had.]
TABLES FOR ASCERTAINING THE VALUE OF TINSTUFF. By Capt. CHARLES THOMAS. 5s.
TAPPING'S HIGH PEAK MINING CUSTOMS. 5s.
TAPPING'S HANDYBOOK ON MERCANTILE, MINING, AND OTHER JOINT STOCK COMPANIES. 2s. 6d.
THE COST-BOOK—TAPPING'S PRIZE ESSAY—WITH NOTES AND APPENDIX. 5s.
TAPPING'S DERBYSHIRE MINING CUSTOMS. 6s.
BOOK-KEEPING BY DOUBLE ENTRY, EXPRESSLY ADAPTED FOR THE IRON TRADE. By G. J. WILLIAMS. Cloth, 10s. 6d.
MINING JOURNEY ACROSS THE GREAT ANDES. By Major RICKARD. 7s. 6
APPING'S COLLIERY AND ORE MINE INSPECTION AND TRUCK ACTS. Cloth, 6s.
TAPPING'S EDITION OF MANLOVE'S CUSTOMS OF THE LEAD MINES OF DERBYSHIRE. 3s.
COST-BOOK SYSTEM—ITS PRINCIPLES AND PRACTICE. 6d.
MINES AND MINING COMPANIES (A Practical Treatise on the Relating to). By WHITTON ARUNDELL. 4s.
MINERS' TABLES. By W. WHITBURN. 4s.
ON COPPER SMELTING. By HYDE CLARKE, C.E. 1s.
MANUAL FOR EXPLORERS. By J. L. WILLSON and C. ROBB. 1s. 6d.
THE ORIGINAL LOCOMOTIVE BY TREVITHICK. On fine paper, 2s.
MINING GLOSSARY—English and Foreign Mining and Smelting Terms. (SECOND EDITION). 2s.
REMARKS ON THE GEOLOGY OF CORNWALL AND DEVON. By Capt. CHARLES THOMAS, of Dolcoath Mine, Cornwall. 1s. 6d.
FORM OF "TACK-NOTE." 5s.
VENTILATION OF COAL MINES. 3d.
MASTERS AND WORKMEN. By MARK FRYAR. 6d.
COAL MINE INSPECTION ACT. 6d.
INVENTIONS, IMPROVEMENTS, AND PRACTICE, OF A COLLIERY ENGINEER AND GENERAL MANAGER. By BENJAMIN THOMPSON. 6s.
NEW WORK ON GAS, &c. By W. HOPTON. 1s.
MINES OF CORNWALL AND DEVON (Statistics of, and Observations on), by T. SPARGO. 5s.; by post, 5s. 4d.
PROGRESS OF MINING IN 1862: BEING THE NINETEENTH ANNUAL REVIEW. By J. Y. WATSON. 1s.

LONDON: Printed by RICHARD MIDDLETON, and published by HENRY ENGLISH, (the proprietors), at their office, 26, FLEET-STREET where all communications are requested to be addressed. [April 16, 1864.